



October 30, 2018

Ms. Jamie Bernard-Drakey  
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**Subject: Site Inspection Report  
Community Laundromat Site, Ava, Missouri  
EPA SEMS ID No.: MON000704080  
U.S. EPA Region 7 START 4, Contract No. EP-S7-13-06, Task Order No. 0189  
Task Monitor: Jamie Bernard-Drakey, Missouri Site Assessment Coordinator**

Dear Ms. Bernard-Drakey:

Tetra Tech, Inc. is submitting the attached Site Inspection Report regarding the Community Laundromat site in Ava, Missouri. If you have any questions or comments pertaining to this submittal, please contact the START Project Manager at (417) 257-9977.

Sincerely,

A handwritten signature in black ink, appearing to read 'Handley'.

Michelle Handley  
START Project Manager

A handwritten signature in blue ink, appearing to read 'Ted Faile'.

Ted Faile, PG, CHMM  
START Program Manager

Enclosures

cc: Debra Dorsey, START Project Officer (cover letter only)

**SITE INSPECTION REPORT  
COMMUNITY LAUNDROMAT SITE – AVA, MISSOURI  
EPA SEMS ID: MON000704080**

**Superfund Technical Assessment and Response Team (START) 4  
Contract No. EP-S7-13-06, Task Order No. 0189**

Prepared For:

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Region 7  
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October 30, 2018

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## 1.0 INTRODUCTION

The Tetra Tech, Inc. Superfund Technical Assessment and Response Team (START) was tasked by the U.S. Environmental Protection Agency (EPA) Region 7 Superfund Division to assist with a Site Inspection (SI) at the Community Laundromat site (the site) in Ava, Missouri. EPA, the Missouri Department of Natural Resources (MDNR), and multiple potentially responsible parties (PRP) had conducted prior investigations associated with the nearby 12th Avenue Solvent site, and had identified numerous volatile organic compounds (VOC), including tetrachloroethene (PCE), in groundwater beneath and downgradient of a light industrial park (Tetra Tech EM Inc. [Tetra Tech] 2001). The site is within this industrial park and is one of several potential sources of the groundwater contamination. Because no source of PCE other than the site has been identified to date, PCE contamination downgradient of the site is likely at least partially attributable to former dry cleaning operations at the site.

One purpose of this SI was to assess groundwater for presence of site-related contaminants. Additionally, evaluation of vapor intrusion (VI) data acquired for this SI and from previous removal assessment activities occurred in accordance with “Addition of a Subsurface Intrusion Component to the Hazard Ranking System, Final Rule” (EPA 2017a). The SI proceeded under authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). SI activities accorded with EPA’s *Guidance for Performing Site Inspections under CERCLA*, Interim Final, publication 9345.1-05 (EPA 1992).

SI sample locations were chosen to determine whether a release of hazardous substances to the environment has occurred, determine whether hazardous substances have impacted specific targets, and delineate suspected source areas (EPA 1992). This report summarizes findings of the SI.

This SI report also includes a summary of the relative threat from actual or potential releases of hazardous substances at the site by application of the EPA Hazard Ranking System (HRS), based on information obtained during the SI. A full HRS scoring memorandum has been prepared by Tetra Tech under separate cover. EPA has adopted the HRS to help set priorities for further evaluation and eventual remedial action at hazardous waste sites. The HRS is the primary method of determining a site’s eligibility for inclusion on the National Priorities List (NPL), which identifies facilities at which EPA may conduct remedial response actions.

By the time of final drafting of this report, EPA had completed a removal action at the site. Approximately 942 cubic yards of contaminated soil had been removed from an area of approximately 1,829 square feet and transported to an approved solid waste landfill. In addition, a groundwater

treatment trailer had been taken offline and removed, and sub-slab VI ports previously installed as part of a Removal Site Evaluation (RSE) and also used for collection of sub-slab vapor samples for this SI had been removed and grouted.

## **2.0 SITE BACKGROUND INFORMATION**

This section discusses characteristics of the site.

### **2.1 SITE LOCATION AND DESCRIPTION**

The site is at 306 Northwest 12th Avenue in the southeast quarter of the northeast quarter of the northwest quarter of Section 11, Township 26 North, Range 16 West in Douglas County, Missouri (see Appendix A, Figure 1). Geographic coordinates at the site are 36.96147 degrees north latitude (39° 57' 41.3") and 92.66235 degrees west longitude (92° 39' 44.4"). The site is in a commercial/residential area in Ava, Missouri. Ava has a population of 2,896 and lies approximately 50 miles southeast of Springfield, Missouri (Google 2018).

The site includes an area where a former laundromat building was located (demolished by the property owner around 2007) and an adjacent building that currently houses the Ava License Office and Action Realty. The remainder of the property is an unpaved parking lot. Land use in the area is a mix of commercial, light industrial, agricultural, and residential properties (see Appendix A, Figure 2).

### **2.2 GEOLOGY, HYDROLOGY, AND HYDROGEOLOGY**

Dominant soils in the area consist of Mano and Ocie soils. Slopes range from 1 to 8 percent (U.S. Department of Agriculture (USDA) 2005). The Mano series consists of very deep, moderately well-drained soils formed on hills in colluvial sediments from cherty limestone and underlying residuum from cherty dolomite (USDA 2004). The upper 33 inches of this soil consists of gravelly silt loam with clay beneath, extending to approximately 80 inches below ground surface (bgs) (USDA 2005). The Ocie series consists of deep, moderately well-drained, slowly permeable soils formed in hillslope sediments and the underlying residuum from cherty dolomite or limestone with thin interbedded sandstone (USDA 2003). The upper 24 inches of this soil consists of very gravelly silt loam with clay beneath, extending to approximately 56 inches bgs (USDA 2005).

Additionally, general soil characteristics can be inferred from the area's bedrock and from soil boring logs obtained during a pre-Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) site screening assessment (SSA) at the site, and during other investigations associated with the 12th Avenue Solvent site in Ava. Reddish-brown to yellowish-brown cherty clays, alternating with red sandy loams grading into sandy clays, are typical soils formed from the Jefferson City Formation underlying the site. The soils are usually thick and well drained (Stohr, St. Ivany, and Williams 1981).

Soil boring logs from the pre-CERCLIS field investigation confirmed this lithology. Depth to bedrock at the site may increase from northeast to southwest, in the direction of surface drainage and groundwater flow. Borings at the southern portion of the site encountered bedrock refusal at about 22 feet bgs, whereas a boring at the northern portion of the site encountered refusal at about 8 feet bgs. Well logs from off-site monitoring wells installed during 12th Avenue Solvent site investigations confirmed that the overburden is approximately 10 to 15 feet thick immediately west and north of the site. Proceeding southwest from the site, overburden thickness increases to as much as 20 feet before pinching out at a tributary to Prairie Creek, where bedrock is visible along the streambed (Environmental Strategies Corporation [ESC] 2002). A variable bedrock surface is typical within this area, given the karst geology of the region (Emmett and others 1978).

Local well logs indicate that bedrock underlying the site consists of Ordovician and Cambrian age dolomites and sandstones extending from approximately 20 to more than 1,000 feet bgs. The uppermost bedrock formation is the Jefferson City Dolomite, which extends to approximately 400 feet bgs (MDNR 2001a). This formation is the base of the Ozark confining unit, which overlies the Ozark aquifer. However, the Jefferson City Dolomite does produce some water, and is considered by itself to be a leaking confining unit (U.S. Geological Survey [USGS] 1989). Vertical migration within the Jefferson City Dolomite is limited primarily to the upper 5 feet of the unit, where weathering has produced significant solution voids. Within the unweathered dolomite, flow becomes primarily horizontal, and is restricted mostly to bedding planes and discontinuous vertical fractures (MDNR 2001b). Beneath the Jefferson City Dolomite, the Roubidoux Formation, Gasconade Dolomite, and Eminence Dolomite combine to form a single hydrologic unit (Ozark aquifer) to depth of more than 1,000 feet bgs (MDNR 2001a). Karst features are possible in the area (Emmett and others 1978). Direction of shallow groundwater flow is likely to follow the site's topography (sloping west to southwest), with depth to groundwater variable but generally approximately 15 to 17 feet bgs at the site.

Several water supply wells are within a 4-mile radius of the site, including three active municipal wells within 0.75 mile. Municipal Well No. 4 is about 400 feet (0.08 mile) north of the site and is the closest known water supply well. Ava Well No. 6 is 0.36 mile northeast and Ava Well No. 5 is 0.6 mile southeast of the site. These three wells serve a reported 3,082 people according to the EPA Safe Drinking Water Information System.

Drainage at the site infiltrates surface soil or flows overland following the topographic gradient, to the south-southwest. The 2-year, 24-hour rainfall for the area is between 3.5 and 4 inches, and Ava receives on average 44.33 inches of precipitation.

The site is at an elevation of about 1,280 feet above mean sea level, and slopes to the west and southwest (USGS 1982). Overland flow follows a ditch on the north side of Northwest 12<sup>th</sup> Avenue. The site lies outside of the 500-year floodplain of Prairie Creek. A contaminated “wetland area” that drains into an unnamed tributary of Prairie Creek has not been mapped by the U.S. Fish and Wildlife Service National Wetlands Inventory, and the tributary to Prairie Creek is depicted as intermittent on the USGS topographic map. The tributary passes beneath Northwest 12th Avenue and flows south-southwest for about 2 miles, where it joins the headwaters of Prairie Creek just south of the City of Ava’s sewage disposal pond. Prairie Creek flows southwest for approximately 6 miles, where it enters Cowskin Creek. The confluence of Prairie Creek and Cowskin Creek occurs shortly (0.5 mile) before Cowskin Creek’s confluence with Beaver Creek. Beaver Creek is the largest surface water body within 15 miles of the site. No drinking water intakes exist on any of these streams (Camp Dresser & McKee Federal Programs Corporation [CDM] 1993).

The unnamed tributary and Prairie Creek exhibit both gaining and losing conditions over various intervals, depending on the nature of the underlying bedrock. (A “losing stream” loses 30 percent or more of its flow into underlying bedrock.) From Northwest 12th Avenue southward, to a point approximately 100 feet north of Southwest 10th Avenue, the unnamed tributary appears to be a gaining stream. Over the next 200 feet, water is present in the form of intermittent pools as the creek crosses a stratigraphic contact between the Jefferson City Dolomite (upstream side) and the more permeable Roubidoux Formation (downstream side). For the next 0.25 mile, the tributary is completely dry and considered a losing stream. Gaining conditions resume about 300 feet south of Southwest 4th Avenue, where the tributary crosses a fault, and flow resumes over the Jefferson City Dolomite. Gaining conditions continue to the headwaters of Prairie Creek. However, Prairie Creek crosses a second fault about 0.75 mile downstream from the first fault, and losing conditions return as flow once again occurs over the Roubidoux Formation. No flow occurs within Prairie Creek beyond the northwest quarter of the northwest quarter of the southeast quarter of Section 16, Township 26 North, Range 16 West (MDNR 2001b).

## **2.3 OPERATIONAL HISTORY AND WASTE CHARACTERISTICS**

This section describes the operational history at and near the site and discusses waste characteristics.

### **2.3.1 Operational History**

As of 2001, when the facility was first identified as a potential source of groundwater contamination, the laundromat was providing only coin-operated washers and dryers; however, according to the former

facility operator, Mr. Joe Banta of Ava, the facility had provided dry cleaning services for “a few years” during the late 1980s and early 1990s. Mr. Banta also confirmed that the facility had used PCE during the years when dry cleaning services were offered, and that a “normal amount” of spillage may have occurred during that time. Mr. Banta had opened the laundromat in 1986, and operations ceased in 2004. The current property owner is Mr. John Sutton, also of Ava. The site includes an area previously occupied by a laundromat building (demolished by the property owner around 2007) and an adjacent building that currently houses the Ava License Office and Action Realty. The remainder of the property is an unpaved parking lot.

### **2.3.2 Waste Characteristics**

Previous investigations at the site have identified PCE as the primary contaminant of concern, detected at concentrations exceeding health-based benchmarks.

#### **PCE**

PCE is a chlorinated solvent with an ether-like odor, typically used in dry cleaning operations and as a degreaser for metal parts (Agency for Toxic Substances and Disease Registry [ATSDR] 1997). PCE is denser than water and tends to be at greater depths with increasing distance from the source area when released to the environment.

PCE was introduced as a dry cleaning solvent in 1934, and by 1948 had replaced carbon tetrachloride as the major chlorinated dry cleaning solvent used in the United States (petroleum solvents still dominated overall). By 1962, dry cleaning operations accounted for 90 percent of PCE used in the United States. At one time, PCE had been mixed with grain protectants and certain liquid grain fumigants, but this practice had been banned by 1980 (Meister Publishing Company [Meister] 1980). PCE degrades to trichloroethene (TCE).

#### **TCE**

TCE is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste (ATSDR 2003). It is used mainly as a solvent to remove grease from metal parts, and is an ingredient in adhesives, paint removers, and spot removers. TCE is denser than water and is typically found at greater depths with increased time or distance from the source area when released to the environment. TCE is reasonably anticipated to be a human carcinogen. Drinking small amounts of TCE for long periods may cause liver and kidney damage, impair immune system function, and impair fetal development in

pregnant women (ATSDR 2003). The *cis* and *trans* isomers of 1,2-dichloroethene (DCE) are common degradation products from TCE.

## **2.4 PREVIOUS INVESTIGATIONS**

The following section describes activities during previous investigations at the site and sampling results from those investigations.

### **2.4.1 Pre-CERCLIS Site Screening Assessment**

EPA conducted a pre-CERCLIS field investigation on July 9 and 10, 2001. EPA and Tetra Tech START installed five soil borings (SB-1 through SB-5) across the site using a track-mounted Geoprobe®. Continuous cores were collected at each boring location by use of Geoprobe's Macro-Core® sampling system. Cores were collected from ground surface to refusal (assumed bedrock surface).

Soil samples were collected within two depth intervals at SB-1 through SB-4. One sample was collected within the 0- to 2-foot bgs interval at each of these borings. A deeper sample was collected at or just above first occurrence of groundwater. At SB-5, a sample was collected within the 0- to 2-foot bgs interval only, due to refusal at a relatively shallow depth of 8 feet bgs.

All soil samples were analyzed for VOCs, semivolatile organic compounds (SVOC), and metals. Only VOC contamination is discussed here, as concentrations of other contaminants were relatively insignificant; complete sample results are in the pre-CERCLIS report (Tetra Tech 2001).

PCE was found at 19 micrograms per kilogram (µg/kg) in a soil sample collected at SB-1 within 17 to 18 feet bgs (very near the water table). PCE was also found at 570 µg/kg in a soil sample collected at SB-4 within 13 to 14 feet bgs.

Groundwater samples were collected at SB-1 and SB-2 by use of Geoprobe's Screen Point 15® sampling system. The static water level at SB-1 was about 16.7 feet bgs. The static water level at SB-2 was approximately 17.0 feet bgs. Saturated conditions were noted during soil sampling at SB-4 within a depth interval of about 12.5 to 14 feet bgs. However, an attempt to collect a groundwater sample at SB-4 was unsuccessful, presumably because the saturated interval was too narrow, a borehole skin precluded infiltration of water through the well screen, or the screen became clogged.

PCE was found at 1,300 micrograms per liter (µg/L) in the groundwater sample collected at SB-1 (EPACLGW1) within 16 to 18 feet bgs. This sample also contained 1,1,1-trichloroethane (TCA) at

12 µg/L. A PCE concentration of 6 µg/L was reported in the groundwater sample collected at SB-2 (EPACLGW2) within approximately 17 to 21 feet bgs.

#### **2.4.2 2002 Removal Site Evaluation**

In February 2002, MDNR conducted an RSE at the site. During this sampling event, 28 soil samples were collected from 19 borings (CL-01 through CL-19). PCE was reported in 10 of the samples at six boring locations. Reported concentrations ranged from 13 µg/kg in CL-08 (16 feet bgs), to 12,400 µg/kg in CL-10 (19 feet bgs) (ATSDR 2005).

MDNR also installed four temporary wells using direct-push technology (DPT) equipment. Groundwater samples collected from these wells (MW-CI-01 through MW-CI-04) contained PCE at concentrations ranging from 1.7 µg/L in MW-CI-04 to 21,400 µg/L in MW-CI-01 (ATSDR 2005). Groundwater samples were collected immediately below the water table (i.e., above bedrock) at all DPT sampling locations.

During the RSE, MDNR also sampled a spring about 1,500 feet southwest (downgradient) of the site. The spring had been sampled previously by MDNR in May 2001. The 2001 sample had contained 35.1 µg/L of PCE (MDNR 2002), and the sample collected during the 2002 RSE contained a similar PCE concentration of 37.3 µg/L (ATSDR 2005).

#### **2.4.3 2007 Removal Site Evaluation**

Following demolition of the laundromat building, soil and concrete sampling occurred in April 2007 to determine whether PCE contamination was present in soil beneath the slab-on-grade and basement floor of the former building (the slab-on-grade and basement had been left intact during demolition). The intent was also to further delineate the extent of PCE contamination in soil beyond the footprint of the former laundromat building. April 2007 activities also included collection of a water sample from a sump at the southeast corner of the basement.

Results of soil sampling indicated PCE levels above the Missouri Risk-Based Corrective Action (MRBCA) soil threshold of 141 micrograms per kilogram (µg/kg) (for protection of domestic groundwater use) beneath the central portion of the basement floor, and beneath the slab-on-grade immediately north of the basement. A low concentration of PCE was reported in a concrete sample collected at the central portion of the basement floor, indicating that a nearby release may have occurred inside the former dry cleaning facility. High concentrations of PCE detected in soil beneath the slab-on-grade (up to 5,400 µg/kg) indicated a release also may have occurred in that area. PCE concentrations beneath the basement floor were as high as 400 µg/kg. PCE levels detected in soil



samples collected west of the former building were consistent with levels reported in samples collected within that area during previous investigations. No PCE was detected in the sump water sample, indicating that the sump probably contained rainwater (Tetra Tech 2007).

Moreover, as part of an Evaluation of Removal Action Alternatives, the suspected source area was delineated in 2007 based on PCE concentrations detected in soil that exceeded the state cleanup level at the time (Tetra Tech 2007). Proposed excavation areas encompassed approximately 4,800 square feet (ft<sup>2</sup>). Soils were to be excavated to refusal which, for the purpose of estimating volume, was assumed to average 15 feet bgs across the site. Based on this assumption, total volume of soil to be removed would be approximately 2,670 bank (undisturbed) cubic yards (byd<sup>3</sup>) of soil. No subsurface liner existed beneath the source area, and contaminants in soil were not considered contained.

#### **2.4.4 2016 Removal Site Evaluation**

In 2016, an RSE was conducted to further delineate extents of PCE contamination in soil and groundwater on site—an objective partially accomplished during a Preliminary Assessment (PA) completed under the START 2 contract in July 2001, an initial RSE by MDNR in February 2002, and an RSE completed under the START 3 contract in 2007. Additional objectives were to assess potential release of contamination into surface water, and to assess potential impacts on indoor air from possible VI.

Analytical results from subsurface soil sampling at the site indicated detections of PCE at all five soil boring locations, ranging from 74 to 809 µg/kg. Except in a sample collected at SB-1, all detections exceeded the MRBCA threshold of 141 µg/kg for protection of domestic groundwater use.

Analytical results from groundwater sampling at three on-site monitoring wells indicated the presence of PCE in all samples. PCE concentrations ranged from 58 to 2,400 micrograms per liter (µg/L), exceeding the EPA Maximum Contaminant Level (MCL) of 5 µg/L in all samples. Also, 1,2-dichlorobenzene and TCE were detected in one of the wells at levels below their respective EPA MCLs.

Of the two surface water samples collected, only one sample (from location SW-1, approximately 1/3 mile southwest of the site) contained a detected concentration of PCE. In that sample, PCE was reported at 2.3 µg/L, exceeding the MDNR water quality standard for drinking water supply of 0.8 µg/L, but below the MDNR water quality standard for human health protection (fish consumption) of 8.85 µg/L. No other VOC was detected in the surface water samples.

Several VOCs were detected in outdoor ambient air and indoor air samples; however, with only a few exceptions, all indoor detections were below EPA Regional Screening Levels (RSL). The two residential air samples contained 1,1,2-TCA concentrations above the EPA RSL of 0.21 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ), and both indoor air samples from the on-site building contained naphthalene at concentrations exceeding the EPA RSL of 13  $\mu\text{g}/\text{m}^3$ .

Several VOCs were detected in sub-slab vapor samples. By use of EPA's Vapor Intrusion Screening Level (VISL) calculator, an action level for each detected analyte was determined; no sub-slab vapor result exceeded any calculated action level (Tetra Tech, Inc. 2017).

### **3.0 SITE INSPECTION ACTIVITIES**

On April 3 and 4, 2018, Tetra Tech START members Michelle Handley and Josh Mellema conducted indoor air and sub-slab vapor sampling for the SI. Lorenzo Sena and James Regehr of EPA Region 7 operated DPT equipment for groundwater sampling on April 3, 2018.

Photographic documentation of field activities is in Appendix B. Field activities were documented in a site logbook, a copy of which is in Appendix C. Copies of field sheets and chain-of-custody records for the SI are in Appendix D, and copies of analytical data reports are in Appendix E.

#### **3.1 GROUNDWATER SAMPLING**

The site-specific Quality Assurance Project Plan (QAPP) proposed 11 direct-push technology (DPT) groundwater sampling locations at and around the site to delineate the extent of contamination. However, at the time of the fieldwork, access had been granted at only eight of those 11 locations.

EPA attempted to advance DPT tooling at two upgradient locations; however, multiple attempts to reach groundwater at both locations failed because of geologic refusal. EPA subsequently encountered the same result at four of the remaining six locations. EPA concluded that regional geologic conditions would necessitate larger equipment for groundwater sampling and demobilized from the site. The following week, EPA and START met to discuss the prospect of a second mobilization to attempt groundwater sampling, and decided that previous groundwater data from nearby locations would suffice for completion of the SI.

#### **3.2 INDOOR AIR SAMPLING**

EPA gained access to residential and commercial properties downgradient of the site for indoor air and sub-slab vapor sampling (see Figure 3 in Appendix A). Results from this sampling were used to assess threats to human health from site contaminants via VI.

The QAPP proposed sampling at three commercial buildings and one residence previously sampled by EPA in 2016, as well as an additional six commercial buildings and one additional residence. EPA gained access to two additional residences, but only two additional commercial buildings.

Twelve indoor air samples were collected inside five commercial buildings and three residences in the site vicinity. For the indoor air sampling, Summa® canisters were fitted with passive flow regulating devices to enable collection of air samples over a continuous 24-hour period. All Summa sampling accorded with EPA Region 7 Standard Operating Procedure (SOP) 4231.1704 – Summa Canister Sampling. One trip blank was also submitted for analysis. Table 1 summarizes air sampling locations, also shown on Figure 3 in Appendix A.

**TABLE 1**  
**INDOOR AIR AND SUB-SLAB VAPOR SAMPLE SUMMARY**  
**COMMUNITY LAUNDROMAT SITE, AVA, MISSOURI**

Sample Number	Sample Type	Location	GPS Coordinates	
			Latitude (°N)	Longitude (°W)
7743-1	Indoor air	601 Springfield Road – living room (residence)	36.9604850	92.6644130
7743-2	Indoor air	511 Springfield Road – basement (residence)	36.9607950	92.6642160
7743-3	Indoor air	Heart of the Hills Food Pantry – storage closet	36.9590360	92.6631200
7743-4	Indoor air	Town & Country Supermarket – east side	36.9603310	92.6624470
7743-5	Indoor air	Town & Country Supermarket – west side	36.9605000	92.6633030
7743-6	Indoor air	405 W. Dean Avenue – living room (residence)	36.9599630	92.6628113
7743-7	Indoor air	Ava Police Department – southeast corner of building	36.9615838	92.6630973
7743-8	Indoor air	Ava Police Department – northeast corner of building	36.9619980	92.6631640
7743-9	Indoor air	Missouri Ozarks Community Health – west	36.9600141	92.6637943
7743-10	Indoor air	Missouri Ozarks Community Health – east	36.9599933	92.6633682
7743-11	Indoor air	Missouri Ozarks Community Health Wellness Center – south	36.958876	92.6643700
7743-12	Indoor air	Missouri Ozarks Community Health Wellness Center – north	36.9590759	92.6643851
7743-13	Sub-slab	Town & Country Supermarket – east side	36.9603310	92.6624470
7743-14	Sub-slab	Heart of the Hills Food Pantry – storage closet	36.9590360	92.6631200
7743-15	Sub-slab	Ava Police Department – southeast corner of building	36.9615838	92.6630973
7743-16	Sub-slab	Ava Police Department – northeast corner of building	36.9619980	92.6631640
7743-17	Sub-slab	Missouri Ozarks Community Health – west	36.9600141	92.6637943
7743-18	Sub-slab	Missouri Ozarks Community Health – east	36.9599933	92.6633682
7743-19	Sub-slab	Missouri Ozarks Community Health Wellness Center – south	36.9588760	92.6643700
7743-20	Sub-slab	Missouri Ozarks Community Health Wellness Center – north	36.9590759	92.6643851

Notes:

GPS      Global positioning system  
°N      Degrees north  
°W      Degrees west

### 3.3 SUB-SLAB VAPOR SAMPLING

Eight sub-slab vapor samples were collected beneath foundations of five structures. At each sampling location, a rotary hammer drill and concrete bit were used to penetrate the concrete floor. A stainless

steel tube was then lowered into the hole, the annulus around the tube was sealed with cement grout, and then a Swagelok® fitting was attached to the top of the tube to allow connection to an evacuated Summa canister via disposable 0.25-inch-diameter polyethylene tubing. A grab sample of sub-slab vapors was collected by opening the valve on the Summa canister. Sub-slab vapor sampling accorded with procedures in Region 7 SOP 2318.07 – Vapor Intrusion Port Installation and Sampling. Table 1 above summarizes sub-slab vapor sampling locations, also shown on Figure 3 in Appendix A.

### **3.4 QUALITY ASSURANCE SAMPLING**

To ensure credibility of sample collection, preparation, and shipment, and of analytical data, one Summa trip blank (evacuated canister) was submitted for laboratory analysis with the field samples to maintain quality assurance (QA)/quality control (QC). Except where noted in the next section, QA/QC sampling proceeded according to the approved, site-specific QAPP.

### **3.5 DEVIATIONS FROM THE QAPP**

The following deviations from the QAPP occurred during field sampling:

- The QAPP specified installation and sampling of 11 DPT groundwater wells upgradient and downgradient of the site. However, at the time of the fieldwork, access had been granted at only eight of the 11 locations.

EPA attempted to advance DPT tooling at two upgradient locations on the site; however, multiple attempts to reach groundwater at both locations failed because of geologic refusal. EPA subsequently encountered the same result at four of the remaining six locations. EPA concluded that regional geologic conditions would necessitate larger equipment for groundwater sampling, and demobilized from the site. Therefore, no groundwater samples were collected, and no QC samples associated with groundwater sampling were collected.

- The QAPP specified collection of 15 indoor air samples and 14 sub-slab vapor samples from residences and commercial buildings in the site vicinity. However, at the time of fieldwork, access had been granted at only 12 indoor air locations and eight sub-slab vapor locations.

## 4.0 ANALYTICAL RESULTS

This section summarizes analytical data from indoor air and sub-slab vapor sampling during the SI. Detected results are depicted on Figures 4 and 5 in Appendix A. Copies of analytical data reports are in Appendix E.

### 4.1 INDOOR AIR SAMPLES

Tetra Tech START collected nine indoor air samples at commercial/government buildings, and three indoor air samples at residences. The air samples were analyzed for VOCs via gas chromatography/mass spectrometry (GC/MS) at the EPA Region 7 laboratory. Several VOCs were detected in the indoor air samples (see Appendix A, Figure 4). Table 2 below lists detected VOCs in those samples.

In the residential indoor air samples, concentrations of 1,2-dichloroethane (DCA), 2-propanol, benzene, carbon tetrachloride, chloroform, and ethyl benzene exceeded EPA residential air RSLs and/or Superfund Chemical Data Matrix (SCDM) cancer risk benchmarks. Exceedances are in bold in Table 2 below.

In the commercial indoor air samples, concentrations of 1,2- DCA, 1,4-dichlorobenzene, 2-propanol, benzene, carbon tetrachloride, and chloroform exceeded EPA commercial air RSLs and/or SCDM cancer risk benchmarks. Exceedances are in bold in Table 2 below.

PCE was detected in sample 7743-1 from 601 Springfield Road, sample 7743-6 from 405 W. Dean Avenue, both indoor air samples from the Town and Country Supermarket (7743-4 and 7743-5), and both indoor air samples from Missouri Ozark Health Center (7743-9 and 7743-10). None of these detections exceeded the residential or industrial RSL for PCE.

No detection in any sample exceeded an SCDM non-cancer risk benchmark.

TABLE 2

DETECTED VOCs IN INDOOR AIR SAMPLES  
COMMUNITY LAUNDROMAT SITE, AVA, MISSOURI

Sample ID	Location	Analyte (all results in µg/m³)																											
		1,2,4-Trimethylbenzene	1,2-Dichloroethane	1,3,5-Trimethylbenzene	1,4-Dichlorobenzene	2,2,4-Trimethylpentane	2-Butanone (methyl ethyl ketone)	2-Hexanone	2-Propanol (isopropyl alcohol)	Acetone	Benzene	Carbon Tetrachloride	Chloroform	Chloromethane	Cyclohexane	Dichlorodifluoromethane	Ethyl Acetate	Ethyl Benzene	Heptane	Hexane	m- and/or p-Xylene	Methylene Chloride	o-Xylene	Propene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	Trichlorofluoromethane	Vinyl Acetate
Residential Indoor Air RSLs		63	0.11	63	0.26	NA	5,200	31	210	32,000	0.36	0.47	0.12	94	6,300	100	73	1.1	420	730	100	100	100	3,100	11	5,200	NE	NE	210
Superfund Chemical Data Matrix Cancer Risk		NE	0.1	NE	0.25	NE	NE	NE	NE	NE	0.35	0.40	0.12	NE	NE	NE	NE	1.1	NE	NE	NE	100	NE	NE	10	NE	NE	NE	NE
Superfund Chemical Data Matrix Non-Cancer Risk		NE	7	NE	800	NE	5,000	NE	NE	32,000	30	100	100	NE	NE	NE	NE	1,000	NE	NE	100	600	100	NE	40	5,000	800	1,000	200
7743-1	601 Springfield Rd. – living room (residence)	ND	0.46	ND	ND	ND	2.5	ND	4,900	210	0.39	0.55	0.16	1.1	ND	2.1	3.8	ND	ND	ND	ND	ND	ND	ND	0.9	1.4	1.3	1.7	1.7 J
7743-2	511 Springfield Rd. – basement (residence)	8.4 J	0.16	1.9 J	ND	2.2	ND	2	2.6	12	4.1	0.54	ND	1.1	5.5	2.7	ND	5	5.8	8.2	21	ND	7	0.37	ND	38	ND	1.5	ND
7743-6	405 W. Dean Ave. – living room (residence)	ND	1.4	ND	ND	ND	2.4	ND	44	52	0.49	0.56	0.15	1.4	ND	2.7	2.5	ND	ND	ND	ND	1.8	ND	ND	0.79	0.86	ND	1.6	4.8 J
Commercial Indoor Air RSLs		260	0.47	260	1.1	NA	22,000	130	880	140,000	1.6	2	0.53	390	26,000	440	310	4.9	1,800	3,100	440	1,200	440	13,000	47	22,000	NA	NA	880
7743-3	Heart of the Hills Food Pantry – storage closet	ND	0.1	ND	ND	ND	ND	ND	3.3	72	0.38	0.53	0.13	1.4	ND	2.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.6	0.84 J
7743-4	Town & Country Supermarket – east side	ND	0.11	ND	1.3	22	2.1	ND	15	13	0.6	0.7	2.3	1.4	ND	2.7	7.1	ND	ND	ND	ND	0.96	ND	ND	1.1	1.5	ND	2.9	ND
7743-5	Town & Country Supermarket – west side	ND	0.13	ND	1.9	23	1.9	ND	22	35	0.72	0.75	2.8	1.7	ND	3	4.6	ND	ND	ND	ND	0.87	ND	ND	1.9	2.2	ND	3.4	2.2 J
7743-7	Ava Police Department – southeast corner of building	ND	ND	ND	ND	ND	ND	ND	1.4	56	0.46	0.51	0.13	1.4	ND	2.9	ND	ND	3	ND	ND	ND	ND	ND	ND	ND	ND	1.5	ND
7743-8	Ava Police Department – northeast corner of building	ND	ND	ND	ND	ND	ND	ND	1.1	42	0.41	0.53	0.12	1.4	ND	2.9	ND	ND	2.1	ND	ND	ND	ND	ND	ND	ND	ND	1.5	ND
7743-9	Missouri Ozarks Community Health – west	ND	0.11	ND	ND	ND	2.2	ND	610	73	0.43	0.52	0.37	1.8	ND	2.8	ND	ND	ND	ND	ND	ND	ND	ND	0.63	1.1	ND	1.5	ND
7743-10	Missouri Ozarks Community Health – east	ND	0.13	ND	ND	ND	2.6	ND	2,000	180	0.48	0.58	2	2.7	ND	2.7	1.3	ND	ND	ND	ND	ND	ND	ND	6.1	1.3	ND	1.4	0.77 J
7743-11	Missouri Ozarks Community Health Wellness Center – south	ND	0.13	ND	ND	ND	2.1	ND	27	28	0.51	0.53	0.17	2	ND	2.7	ND	ND	ND	1.5	ND	ND	ND	ND	1.9	ND	1.5	ND	
7743-12	Missouri Ozarks Community Health Wellness Center – north	ND	0.13	ND	ND	ND	2	ND	25	20	0.54	0.54	0.15	2.1	ND	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0.97 J

Notes:

Result in bold indicates exceedance of EPA RSL or SCDM benchmark. RSL values are from May 2018 screening level tables and are based on a target cancer risk of 1E-06 and a target hazard quotient of 1.0.

- EPA      U.S. Environmental Protection Agency
- ID        Identification
- J         Estimated concentration
- µg/m³    Micrograms per cubic meter
- NE        Not established
- ND        Not detected
- RSL      Regional screening level

## **4.2 SUB-SLAB VAPOR SAMPLES**

Tetra Tech START collected eight sub-slab vapor samples from commercial/government buildings. The samples were analyzed for VOCs via GC/MS at the EPA Region 7 laboratory. Several VOCs were detected in the samples (see Appendix A, Figure 5). By use of the VISL calculator, an action level for each detected analyte was determined. The following parameters were used in the VISL calculator:

- Scenario = Commercial
- Target risk for carcinogens =  $1.00\text{E}-06$
- Target hazard quotient for non-carcinogens = 1.0

In the sample collected from beneath the southeast corner of the Ava Police Department (7743-15) immediately west of the site, PCE was detected at a level exceeding the calculated action level. No other action level was exceeded in any sub-slab sample. Table 3 lists detected VOC results from the sub-slab vapor samples.

## **4.3 QA/QC SAMPLES**

QA/QC sampling included one Summa trip blank submitted to the EPA Region 7 laboratory for VOCs analysis. No VOC was detected in the trip blank.



TABLE 3

**DETECTED VOCs IN SUB-SLAB VAPOR SAMPLES  
COMMUNITY LAUNDROMAT SITE, AVA, MISSOURI**

Sample ID	Location	Analyte (all results in µg/m³)								
		2-Butanone	2-Propanol	Acetone	Carbon Tetrachloride	Chloroform	Dichlorodifluoromethane	Tetrachloroethene	Trichlorofluoromethane	Vinyl Acetate
Industrial Soil Gas Action Levels		730,000	29,200	4,510,000	68.1	17.8	14,600	1,570	NA	29,200
7743-13	Town & Country Supermarket – east side	ND	0.95	5.7	0.57	5.5	2.9	ND	1.6	ND
7743-14	Heart of the Hills Food Pantry – storage closet	ND	0.58	1.1	0.49	ND	2.7	ND	1.6	ND
7743-15	Ava Police Department – southeast corner of building	2.2	ND	2.9	ND	ND	ND	2,000	1.6	ND
7743-16	Ava Police Department – northeast corner of building	2	ND	8.8	0.49	ND	1.8	37	1.6	3.9 J
7743-17	Missouri Ozarks Community Health – west	ND	ND	5.5	0.52	ND	2.5	32	1.6	3 J
7743-18	Missouri Ozarks Community Health – east	6	3.5	5.2	0.48	ND	1.7	960	1.6	0.95 J
7743-19	Missouri Ozarks Community Health Wellness Center – south	2.4	ND	4.5	0.54	ND	2.3	2.6	1.6	1.4 J
7743-20	Missouri Ozarks Community Health Wellness Center – north	ND	0.74	ND	0.57	16	2.9	ND	1.7	ND

Notes:

Result in bold indicates exceedance of VISL-calculated action level that was based on a target cancer risk of 1E-06 and a target hazard quotient of 1.0.

EPA U.S. Environmental Protection Agency  
 ID Identification  
 J Estimated concentration  
 µg/m<sup>3</sup> Micrograms per cubic meter  
 NA Not available  
 ND Not detected  
 VISL Vapor intrusion screening level  
 VOC Volatile organic compound

## **5.0 HAZARD RANKING SYSTEM SCORE**

This section discusses preliminary HRS factors in general terms. A more detailed description of the HRS scoring process is included in a separate deliverable—Hazard Ranking System Scoring Memorandum (Tetra Tech, Inc. 2018).

### **5.1 SOURCE OF CONTAMINATION**

A known source of contamination at the site is soil contaminated via previous routine spillage of hazardous substances by the dry cleaner operator—a conclusion based on findings of a pre-CERCLIS site screening assessment in 2001 (see Section 2.4.1); RSEs in 2002, 2007, and 2016 (see Sections 2.4.2, 2.4.3, and 2.4.4, respectively); and this SI. The 2007 removal assessment had estimated the size of the source to be 4,800 square feet and 2,670 cubic yards. This source was removed in fall 2018 under an EPA-funded time-critical removal action.

#### **Other Potential Sources**

MDNR identified the site as one of several potential contaminant sources associated with the 12th Avenue Solvent site—identified in December 2000 by MDNR during its investigation of the nearby Sentinel Wood Treater site. Samples collected about 750 feet downgradient of the site at a groundwater discharge (wetland) area contained the following contaminants: total xylenes (27,600 µg/L), ethylbenzene (10,500 µg/L), *cis*-1,2-DCE (146 µg/L), toluene (79.3 µg/L), 1,1-DCE (51.5 µg/L), PCE (2.4 µg/L), benzene (2.3 µg/L), TCE (2.2 µg/L), and other compounds (MDNR 2002).

Based on results of subsequent investigations by EPA, MDNR, and multiple potentially responsible parties (PRP), the likely primary source of xylene, ethylbenzene, and toluene was determined to be at a facility other than the site.

A groundwater sample collected in October 2017 from upgradient monitoring well PZ-1B contained PCE, TCE, *cis*-1,2-DCE, and vinyl chloride at 26.6 J, 22.4 J, 18.9 J, and 116 µg/L, respectively. J-coded results are estimated. Well PZ-1B is about 570 feet northwest of the site. This finding suggests possibility of a source of chlorinated VOCs upgradient of the site (WSP USA Inc. 2017).

### **5.2 MIGRATION AND EXPOSURE PATHWAYS**

Section 5.2 discusses the migration and exposure pathways evaluated in the HRS scoring process.

### 5.2.1 Groundwater Migration

An observed release of PCE and TCE to shallow groundwater has been documented based on DPT samples collected in June 2016 during the RSE, and from other previous groundwater sampling results. This shallow groundwater occurs in cherty clays that overlie bedrock. Unconsolidated deposits range in thickness from about 8 to 22 feet at the former dry cleaner location. The assumption is that the shallow groundwater in the overburden is interconnected with the deeper Ozark aquifer from which the City of Ava's Public Water Supply is obtained.

Local well logs indicate that bedrock underlying the site consists of Ordovician and Cambrian age dolomites and sandstones extending from approximately 20 to more than 1,000 feet bgs. The uppermost bedrock formation is the Jefferson City Dolomite, which extends to approximately 400 feet bgs (MDNR 2001a). This formation is the base of the Ozark confining unit, which overlies the Ozark aquifer. However, the Jefferson City Dolomite does produce some water, and is considered by itself to be a leaking confining unit (USGS 1989). Vertical migration within the Jefferson City Dolomite is limited primarily to the upper 5 feet of the unit, where weathering has produced significant solution voids. Within the unweathered dolomite, flow becomes primarily horizontal, and is restricted mostly to bedding planes and discontinuous vertical fractures (MDNR 2001b). Beneath the Jefferson City Dolomite, the Roubidoux Formation, Gasconade Dolomite, and Eminence Dolomite combine to form a single hydrologic unit (Ozark aquifer) to depth of more than 1,000 feet bgs (MDNR 2001a). Karst features are possible in the area (Emmett and others 1978). Direction of shallow groundwater flow is likely to follow the site's topography (sloping west to southwest), with depth to groundwater varying but generally approximately 15 to 17 feet bgs at the site.

Several water supply wells are within a 4-mile radius of the site, including three active municipal wells within 0.75 mile. Municipal Well No. 4 is about 400 feet (0.08 mile) north of the site and is the closest known water supply well. Ava Well No. 6 is 0.36 mile northeast and Ava Well No. 5 is 0.6 mile southeast of the site. These three wells serve a reported 3,082 people according to the EPA Safe Drinking Water Information System. Additionally, many domestic wells in the area may utilize the shallow Jefferson City Dolomite as their water source. Municipal Well No. 4 is not known to have been sampled during previous site-related investigations.

### 5.2.2 Soil Exposure, Subsurface Intrusion Component

VI sampling at commercial and residential properties near the site began in June 2016 during the RSE and occurred again in April 2018 during the SI. Sub-slab vapor, indoor air, and outdoor ambient air samples were collected during the RSE and analyzed for VOCs. During the RSE, indoor air sampling occurred at six properties (five commercial and one residential). Sub-slab vapor and indoor air samples were collected during the SI and analyzed for VOCs. During the SI, indoor air sampling occurred at eight properties (five commercial and three residential).

Observed exposures are established via direct observation or chemical analyses. No direct observation of release of hazardous substances occurred during either the RSE or the SI. For an observed release via chemical analysis to be established, the following are required: (1) analytical results from indoor air sampling that indicate concentration(s) of one or more hazardous substances significantly (at least three times) above background concentration(s) for the site for that type of sample, and (2) the contaminant in the release must be attributable to the site. During VI sampling, no consistent sampling of background sub-slab vapor or outdoor ambient air occurred. Therefore, background conditions were considered to be represented by indoor air sample results from buildings crossgradient of the groundwater plume. Indoor air samples collected near the source area at Action Auction and the Ava License Office both contained concentrations of PCE (31.5 and 46.8  $\mu\text{g}/\text{m}^3$ ) above the health-based cancer risk benchmark (10  $\mu\text{g}/\text{m}^3$  for PCE) defined in the Superfund Chemical Data Matrix. Based on those data, an observed exposure of site-related hazardous substances has been established for these nearby targets.

Two full-time workers are reportedly associated with the Ava License Office, and two part-time workers are associated with the Action Auction office. Lower levels of PCE in indoor air (concentrations above background but below health-based benchmarks) have been documented at residences at 405 W. Dean Avenue (also known as 403 NW 11<sup>th</sup> Avenue) and 601 Springfield Road. The reported population associated with these two homes is six. Businesses where PCE has been reported in indoor air samples at concentrations below health-based benchmarks include:

- The Douglas County Health Department at 608 NW 12<sup>th</sup> Avenue, where PCE concentration in indoor air has been detected as high as 2.03  $\mu\text{g}/\text{m}^3$ ; a reported 10 full-time and two part-time workers are associated with this facility
- The Missouri Ozark Community Health Center at 504 NW 10<sup>th</sup> Avenue, where PCE concentration in indoor air has been detected as high as 6.1  $\mu\text{g}/\text{m}^3$ ; a reported 43 full-time workers and one part-time worker are associated with this facility

- The Town and County Grocery at 405 NW 12<sup>th</sup> Avenue, where PCE concentration in indoor air has been detected as high as 1.9 µg/m<sup>3</sup>. A reported 12 full-time and 25 part-time workers are associated with this facility.

### **5.2.3 Surface Water and Air Migration**

These two migration pathways were not the focus of the SI investigation. The air migration pathway focusses on release of contaminants to ambient air. It is unlikely that ambient air samples, if collected, would document a release from the contaminated soil source. Several groundwater discharges to an unnamed tributary to Prairie Creek have been sampled and shown to contain PCE. However, it is believed that the samples were collected from a portion of the stream classified as intermittent. The 2-year, 24-hour rainfall for the area is between 3.5 and 4 inches, and Ava receives on average 44.33 inches of precipitation. The site lies outside the 500-year floodplain of Prairie Creek. The contaminated “wetland area” described in site reports is along the unnamed tributary. This wetland feature is not mapped by the U.S. Fish and Wildlife Service National Wetlands Inventory, and the tributary to Prairie Creek is depicted as intermittent on the USGS topographic map. The tributary passes beneath Northwest 12th Avenue and flows south-southwest for about 1.4 miles, where it joins the headwaters of Prairie Creek just south of the City of Ava’s sewage disposal pond. Prairie Creek is the closest perennially flowing surface water feature.

Prairie Creek flows southwest for approximately 6 miles, where it enters Cowskin Creek. The confluence of Prairie Creek and Cowskin Creek occurs shortly (0.5 mile) before Cowskin Creek’s confluence with Beaver Creek. Beaver Creek is the largest surface water body within 15 miles of the site. No drinking water intakes exist on any of these streams (CDM 1993).

## 6.0 SUMMARY AND CONCLUSIONS

EPA tasked START to complete an SI at the site to assess groundwater for presence of contaminants. Additionally, to aid evaluation of the soil exposure pathway, START acquired VI data during this SI to supplement VI data previously obtained during a removal assessment of the site.

The site-specific QAPP proposed 11 DPT groundwater sampling locations at and around the site to delineate the extent of contamination. However, at the time of the fieldwork, access had been granted at only eight of the 11 locations. EPA's attempts to reach groundwater with DPT tooling were unsuccessful at all sampling locations due to geologic refusal. EPA subsequently concluded that previous groundwater data from nearby locations could be used for the SI.

In all three residential indoor air samples, 1,2-DCA concentrations exceeded the EPA residential air RSL of  $0.11 \mu\text{g}/\text{m}^3$ , benzene levels exceeded the EPA residential air RSL of  $0.36 \mu\text{g}/\text{m}^3$ , and carbon tetrachloride concentrations exceeded the EPA residential air RSL of  $0.47 \mu\text{g}/\text{m}^3$ . A sample from 601 Springfield Road also contained 2-propanol and chloroform concentrations exceeding EPA residential air RSLs of 210 and  $0.12 \mu\text{g}/\text{m}^3$ , respectively. A sample from 405 W. Dean Avenue also contained a chloroform concentration exceeding the EPA residential air RSL.

In both indoor air samples from the Town & Country Supermarket, 1,4-dichlorobenzene concentrations exceeded the EPA industrial air RSL of  $1.1 \mu\text{g}/\text{m}^3$ , and chloroform levels exceeded the EPA industrial air RSL of  $0.53 \mu\text{g}/\text{m}^3$ . In a sample from the east side of Missouri Ozark Health Center, 2-propanol concentration exceeded the EPA industrial air RSL of  $880 \mu\text{g}/\text{m}^3$ , as well as the industrial air RSL for chloroform.

Several VOCs were detected in sub-slab vapor samples. By use of the VISL calculator, an action level for each detected analyte was developed. In a sample collected from beneath the southeast corner of the Ava Police Department immediately west of the site, PCE was detected at a level exceeding the calculated action level. No other action level was exceeded in any sub-slab sample.

By the time of final drafting of this report, EPA had completed a removal action at the site. Approximately 942 cubic yards of contaminated soil had been removed from an area of approximately 1,829 square feet and transported to an approved solid waste landfill. In addition, a groundwater treatment trailer had been taken offline and removed, and sub-slab VI ports previously installed as part of an RSE and also used for collection of sub-slab vapor samples for this SI had been removed and grouted.

## 7.0 REFERENCES

- Agency for Toxic Substances and Disease Registry (ATSDR). 1997. ToxFAQs™ for Tetrachloroethylene. September. Accessed June 4, 2013.  
<http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=264&tid=48>
- ATSDR. 2003. Toxicological Profile for Trichloroethylene. July.
- ATSDR. 2005. Health Consultation. Community Laundromat. City of Ava, Douglas County, Missouri. EPA Facility ID: MON000704080. March 22.
- Camp Dresser & McKee Federal Programs Corporation (CDM). 1993. Site Inspection Report for Site Assessment Activity at the Sentinel Wood Treating Site, Ava, Missouri. Lenexa, Kansas.
- Emmett, Leo F., John Skelton, R.R. Luckey, and Don E. Miller. 1978. Water Resources of the Springfield, Missouri area. Missouri Department of Natural Resources (MDNR), Division of Geology and Land Survey. Water Resources Report #34.
- Environmental Protection Agency, U.S. (EPA). 1992. *Guidance for Performing Site Inspections Under CERCLA*, Interim Final. EPA publication 9345.1-05. September.
- EPA. 2017a. "Addition of a Subsurface Intrusion Component to the Hazard Ranking System, Final Rule."
- Environmental Strategies Corporation (ESC). 2002. Removal Assessment Report for the 12th Avenue Solvents Site, Ava, Missouri. December 19.
- Google. 2018. Population. Accessed July, 2018.  
[https://www.google.com/publicdata/explore?ds=kf7tgg1uo9ude\\_&met\\_y=population&idim=place:2902674&hl=en&dl=en](https://www.google.com/publicdata/explore?ds=kf7tgg1uo9ude_&met_y=population&idim=place:2902674&hl=en&dl=en)
- Meister Publishing Company. 1980. *Farm Chemicals Handbook*. Willoughby, Ohio.
- Missouri Department of Natural Resources (MDNR). 2001a. Missouri Sample Well-Log Library. Log Number 026533, City of Ava Municipal Well No. 4. Jefferson City, Missouri.
- MDNR. 2001b. Geologic Summary of Sentinel Wood Treating, Inc. (Douglas County), MO. Geological Survey Program, Division of Geology and Land Survey. Rolla, Missouri. August 15.
- MDNR. 2002. Removal Assessment Report. Community Laundromat Site, Douglas County, Missouri. MON000704080. April 23.
- Stohr, Christopher J., E. St. Ivany, and J.H. Williams. 1981. Geological Aspects of Hazardous Waste Isolation in Missouri. MDNR. Rolla, Missouri.
- Tetra Tech EM Inc. (Tetra Tech). 2001. Pre-CERCLIS Site Screening Assessment of Community Laundromat, Ava, Missouri. November.
- Tetra Tech. 2007. Trip Report and Data Summary for Removal Site Evaluation Activities, Community Laundromat Site, Ava, Missouri. Prepared for the U.S. Environmental Protection Agency (EPA). April.

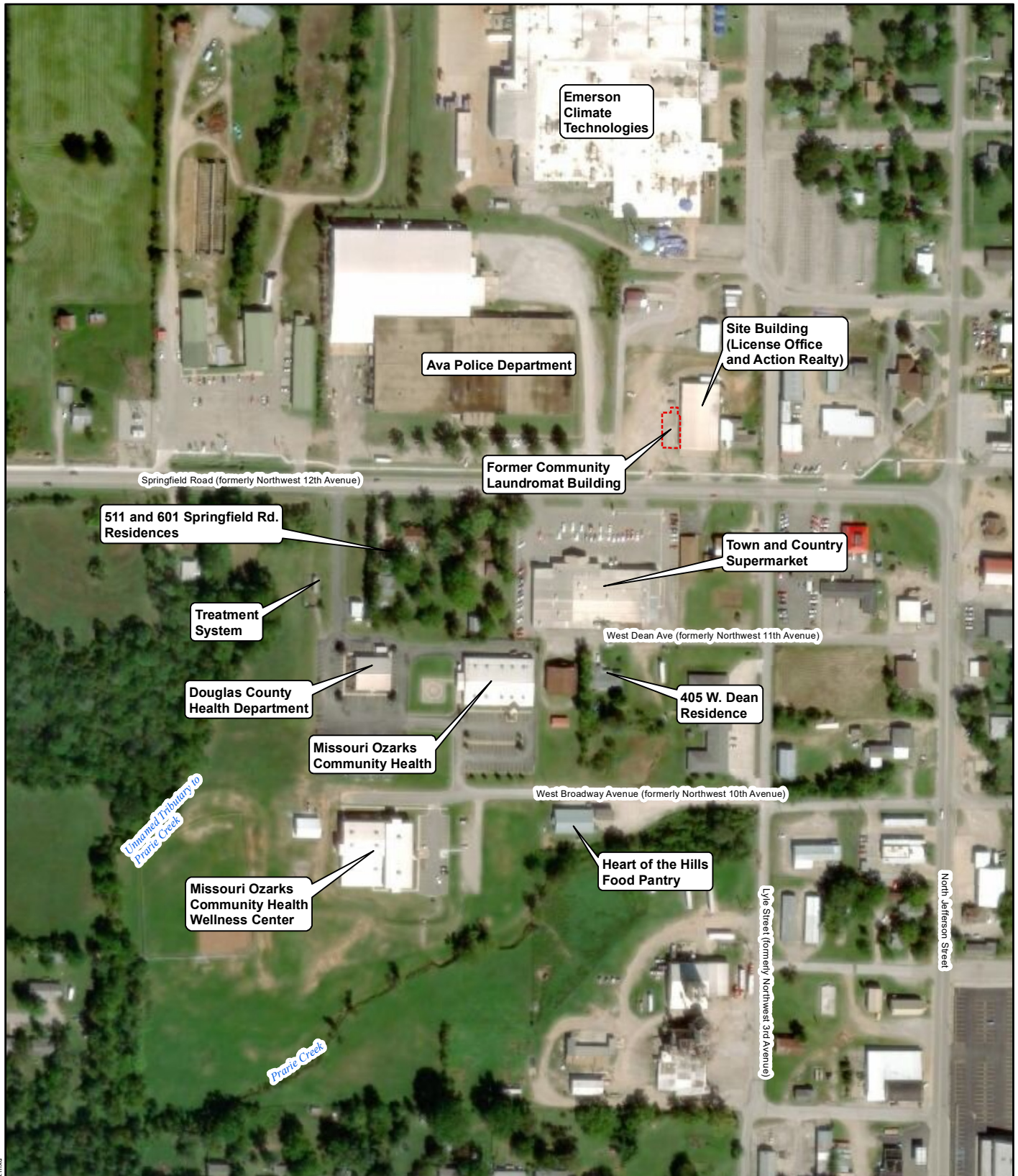
- Tetra Tech, Inc. 2017. Removal Site Evaluation Report, Community Laundromat Site, Ava, Missouri. Prepared for the U.S. EPA. February.
- Tetra Tech, Inc. 2018. Hazard Ranking System Scoring Memorandum, Community Laundromat Site, Ava, Missouri.
- U.S. Department of Agriculture (USDA). 2003. Official Soil Series Descriptions. Ocie Series. Natural Resources Conservation Service (NRCS). February. Accessed on February 9, 2017. [https://soilseries.sc.egov.usda.gov/OSD\\_Docs/O/OCIE.html](https://soilseries.sc.egov.usda.gov/OSD_Docs/O/OCIE.html)
- USDA. 2004. NRCS Official Soil Series Descriptions. Mano Series. February. Accessed on February 9, 2017. [https://soilseries.sc.egov.usda.gov/OSD\\_Docs/M/MANO.html](https://soilseries.sc.egov.usda.gov/OSD_Docs/M/MANO.html)
- USDA. 2005. NRCS Soil Survey of Douglas County, Missouri, Version 1.0. November 15.
- U. S. Geological Survey (USGS). 1982. 7.5 minute topographic map, Ava, Missouri Quadrangle.
- USGS. 1989. Water Resources Investigations Report 89-4079. Analysis of the Effect of Pumping on Ground-water flow in the Springfield Plateau and Ozark Aquifers near Springfield, Missouri. Jeffrey L. Imes. Washington, DC.
- WSP USA Inc. 2017. 12<sup>th</sup> Avenue Solvents Site, Monthly Project Status Report, Report No. 192. November.



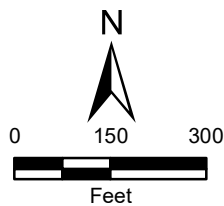
## **APPENDIX A**

### **FIGURES**





Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Community Laundromat  
Ava, Missouri

**Figure 2**  
Site Layout Map



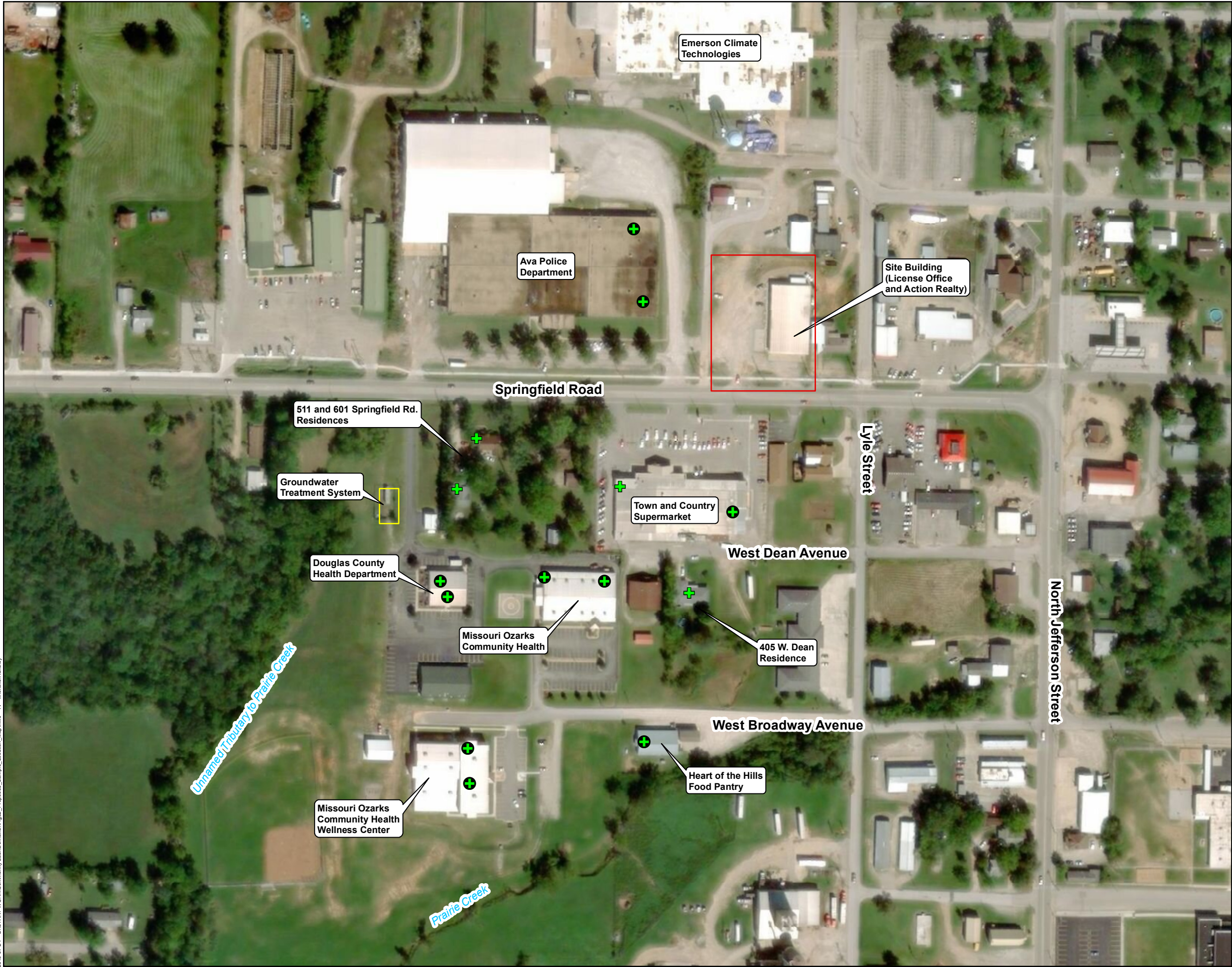
Date: 2018-07-24

Drawn By: Michelle Handley

Project No: I9025180189.000

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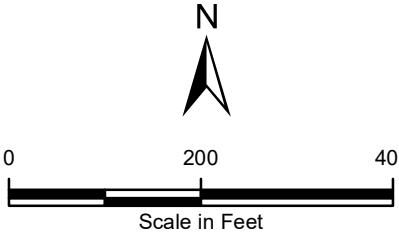




Approximate Site Boundary

- Indoor Air / Sub-slab Soil Gas Sample Location
- Indoor Air Sample Location

Aerial Image Source: National Agriculture Imagery Program (NAIP), 8/2016.



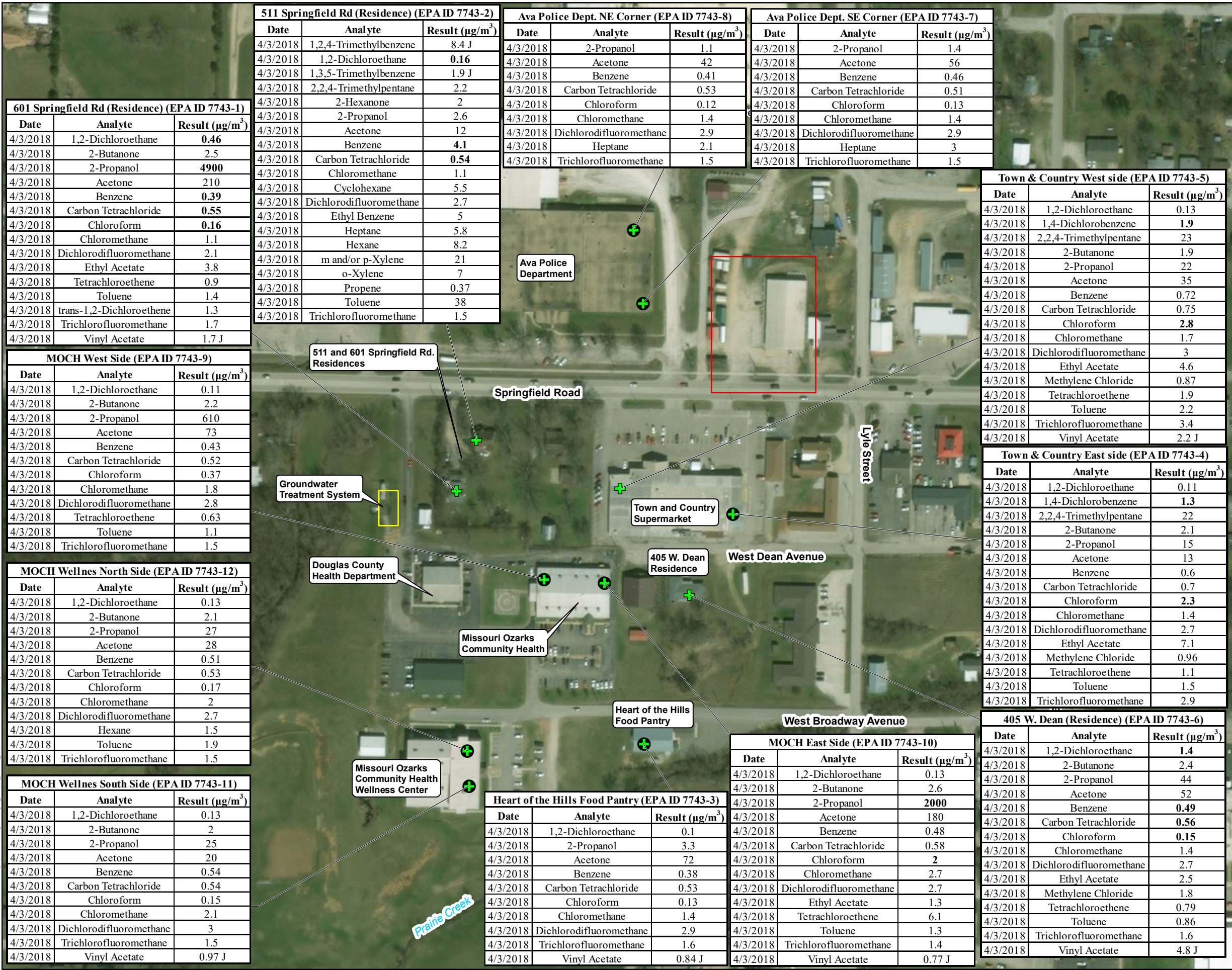
Community Laundromat  
Ava, Missouri

**Figure 3**  
Sample Location Map





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Approximate Site Boundary

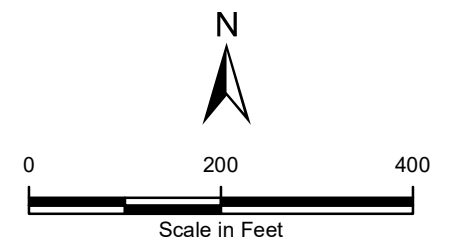
Indoor Air / Sub-slab Soil Gas Sample Location

Indoor Air Sample Location

EPA - U.S. Environmental Protection Agency  
ID - identification  
RSL - Regional Screening Level  
SCDM - Superfund Cancer Data Matrix  
µg/m<sup>3</sup> - micrograms per cubic meter

NOTE: Result in bold indicates exceedance of EPA RSL or SCDM benchmark.

Aerial Image Source: National Agriculture Imagery Program (NAIP), 8/2016.



Community Laundromat  
Ava, Missouri

**Figure 4**  
Indoor Air Sample Results





